F·A·A·M facility for airborne atmospheric measurements

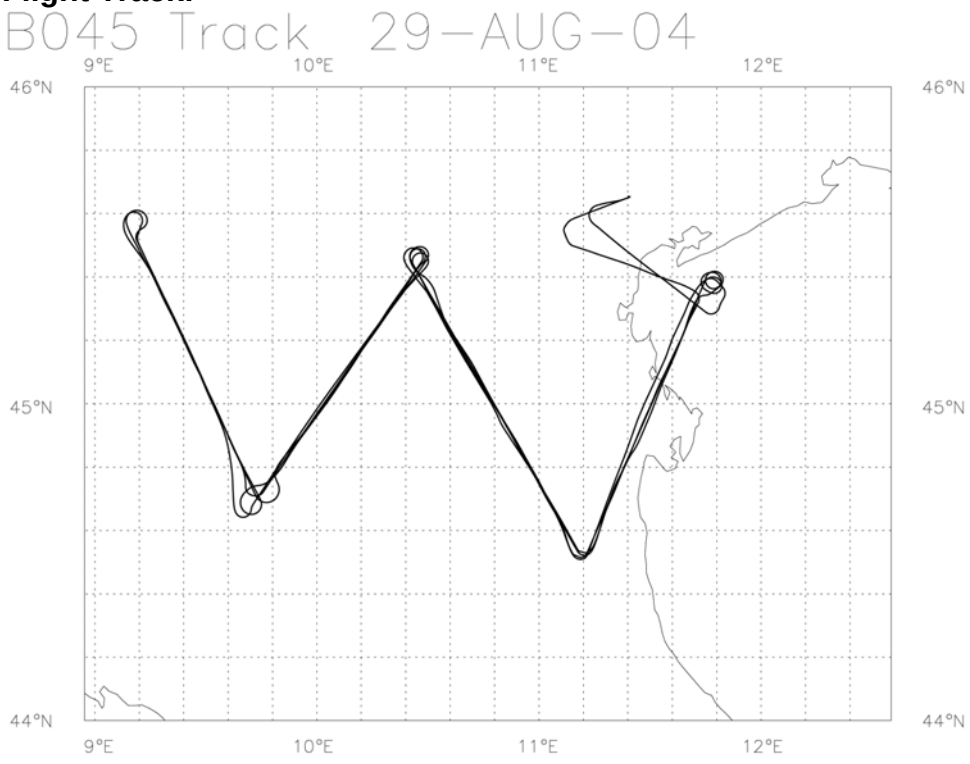
FLIGHT FOLDER

Flight No.:	B045
Date:	29 Aug 2004
Take Off	07:58:59
Landing:	12:58:41
Flight Time	4h59m42

Trials Instructions: ADRIEX – flight to investigate pollution in the Po Valley, Italy
Operating Area: Po Valley, N Italy

POB	Position	Name	Institute
1	Captain	Alan Foster	Directflight
2	Co-pilot	Alan Roberts	Directflight
3	Co-pilot 2	Ian Ramsay-Rae	Directflight
4	Mission Scientist 1	Ellie Highwood	Met Office
5	Flight Manager	Maureen Smith	FAAM
6	Core Chemistry	Doug Anderson	FAAM
7	CVI	Paul James	FAAM
8	TDL / WAS / PAN / Tubes	Jim McQuaid	Leeds University
9	Cloud Physics	Martyn Pickering	Met Office
10	SWS	Andy Wilson	Met Office
11	Filters	Paola Formenti	CNRS/University of Paris 12
12	AMS	Hugh Coe	UMIST
13	VACC	Stuart Heath	FAAM
14	Mission Scientist 2	Simon Osborne	Met Office
15	Mission Scientist 3	Nicolas Bellouin	Met Office
16	Mission Scientist 3	Jolene Cook	Reading University
17	CCM	Sue Angold	Directflight
18			
19			

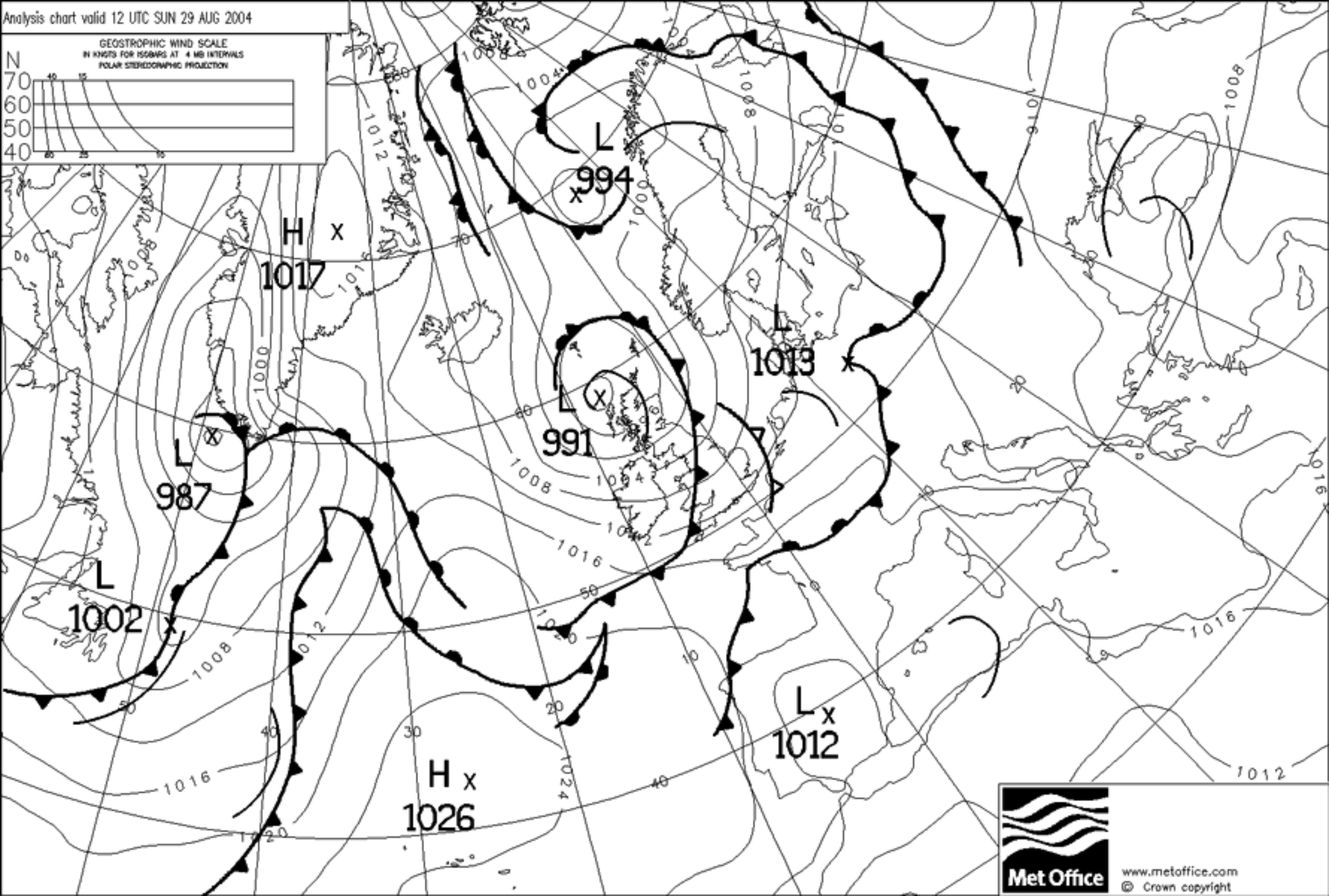
Flight Track:



FLIGHT SUMMARY

Flight No B045
Date: 29/08/04
Project: ADRIEX
Location: Po Valley

Start Time	End Time	Event	Height (s)	Hdg	Comments
075859		T/O	4.9 kft	131	Treviso
080808		Videos	4.9 kft	130	Start Recording
081256	081616	Profile 1	4.9 - 3.0 kft	215	
081846	081950	Profile 2	3.0 - 3.9 kft	204	
082001	082809	Run 1.1	4.0 - 3.9 kft	204	A to B
082942	084608	Run 1.2	3.9 kft	336	B to C
084815	090258	Run 1.3	3.9 kft	222	C to D
090509	091935	Run 1.4	3.9 kft	358	D to E
092303	093419	Profile 3	3.9 - 15.0 kft	155	E to D, 1000fpm
093935	094924	Profile 4	15.0 - 3.0 kft	034	D to C, Interrupt
095308	095424	Profile 4	2.9 kft	335	
095425	100952	Run 2.1	2.9 kft	335	C to B
101107	102322	Run 2.2	2.9 - 3.0 kft	335	B to A
102322	102441	Profile 5	2.9 kft	334	
103404	104816	Run 3.1	3.0 kft	335	A to B
105019	105300	Run 3.2	3.0 kft		B to C
105300	105632	Profile 6	5.0 - 3.0 kft	334	
105748	110516	Run 3.3	2.9 kft	334	
110823	112207	Run 3.4	2.9 kft	335	C to D
112414	113657	Run 3.5	2.9 kft	335	D to E
114052	115336	Profile 7	2.9 - 15.0 kft	146	at Delta
115832	120936	Profile 8	15.0 - 3.0 kft	039	D to C
121248	122958	Run 4.1	2.9 - 3.0 kft	145	C o B
123131	124426	Run 4.2	3.0 kft	020	B to A
125841		Land	0.00 kft	339	Treviso
140159		UBBRs	0.00 kft	359	Covered


Analysis chart valid 12 UTC SUN 29 AUG 2004
GEOSTROPHIC WIND SCALE
IN KNOTS FOR ISOBARS AT 4 MB INTERVALS
POLAR STEREOGRAPHIC PROJECTION
N
70
60
50
40
40
15
60
25
10
L
994
H
1017
L
1013
L
991
L
987
L
1002
H
1026
L
1012
1000
1004
1008
1012
1016
1020
1024
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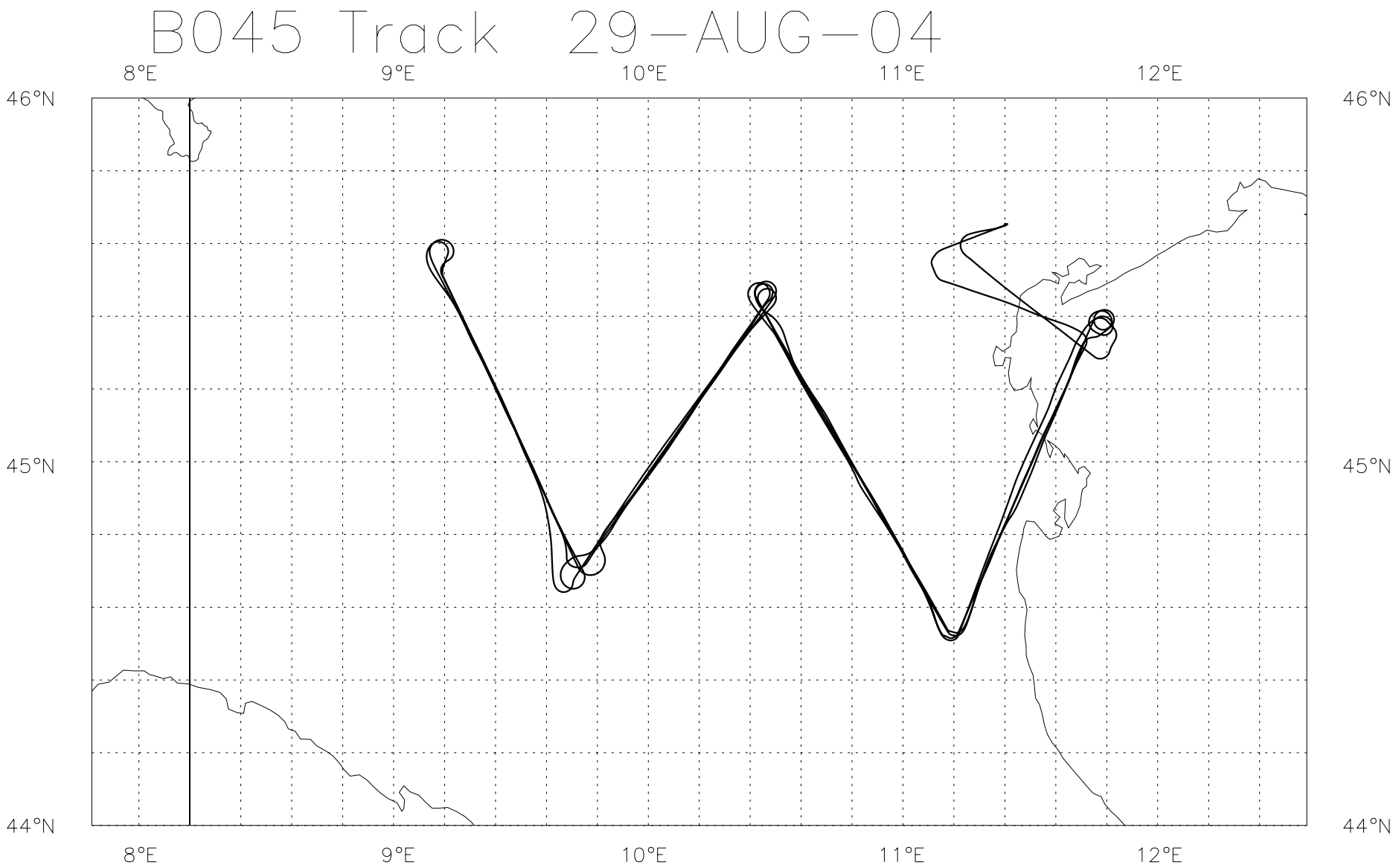
B045 Track 29-AUG-04
8°E
9°E
10°E
11°E
12°E
46°N
45°N
44°N

FAAM Sortie Brief

Flight Number: B045 Date: Sunday 29th August

Purpose: ADRIEX flight to investigate pollution in the Po Valley, Italy.

Weather: Predominantly cloud-free. Heavy pollution preferred.

Flight Pattern:

1) Take off Treviso 08:00Z.
2) Transit to point A, (45°18'51''N,12°30'29''E) (15mins).
3) SLR at 3000ft from A to point B (44°30'N,12°00'E) (30mins).
4) SLR at 3000ft from B to point C at Soave (45°25'N,11°15'E) (50mins).
5) SLR at 3000ft from C to point D at Reggio Nell Emilia (44°42'N,10°32'E) (65mins).
6) SLR at 3000ft from from D to point E at (45°30'N,10°00'E) (80mins).
7) Profile ascent to FL150 from point E to point D (95mins).
8) Profile descent from FL150 to 3000ft from point D to point C (110mins) .
9) SLR at 3000ft from point C to point B (130mins).
10) SLR at 3000ft from point B to point A (145mins).
11) Repeat 3-10 (290mins).
12) If time permits, perform a series of sampling runs within the aerosol plume.

Point A (Ocean Tower)	45°18'51''N,12°30'29''E
Point B	44°30'N,12°00'E
Point C (Soave)	45°25'N,11°15'E
Point D (Reggio Nell Emilia)	44°42'N,10°32'E
Point E	45°30'N,10°00'E

Sortie Debrief

Flight Number: B045 Date: 29th August 2004

Sortie Objectives: ADRIEX flight #3. To investigate the pollution up the Po Valley using in-situ measurements for comparison with ADRIEX flight #1.

Operating area: Po Valley and ocean areas over the northern Adriatic Ocean. 5 points were defined:-

A:-	Ocean Tower	45°18'51''N, 12°30'29'E
B:-		44°30'N, 12°00'E
C:-	Soave	45°25'N, 11°15'E
D:-	Reggio Nell Emilia	44°42'N, 10°32'E
E:-		44°30'N, 10°00'E

Weather: Extensive contrails and cirrus particularly at the start of the flight. During the first half of the flight, cloud top was around 3000ft along the Po Valley. During the second half, Cu extended between approx 4000-7000ft. Scattered Cu increased towards the north side of the valley, as did the pollution. Two pollution layers clearly visible, one above, and one below cloud level. Should compare this with B043.

Flight Patterns:
Take off from Treviso at ~08:00. Transit to point A at 5000ft. Profile descent to 3000ft towards point B on the first leg of the zig-zag up the Po Valley. The first run was interrupted and ascent necessary to 4000ft to avoid cloud. The remainder of the zig-zag pattern was then performed at 4000ft up the Po Valley from point A->B->C->D->E. The aircraft was above the boundary layer for the duration of these legs and a fairly extensive aerosol layer was evident above the cloud, particularly towards the northern side of the valley. CN and neph showed variation in aerosol concentration, but AMS showed more homogeneity in constituents. Various local pollution sources were also detected by AMS and nephelometer. At the ocean tower at point A, a profile ascent to 5000ft allowed pilot change-over. A profile descent was then performed to 3000ft, to below the Sc Cu and towards point B. The zig-zag pattern A->B->C->D-> was repeated at 3000ft. Conditions alternated between clear and Sc Cu below. High NO and CN counts of 91000 observed during these runs. Peaks in CO and neph observed at turn at point E over the motorway. A reciprocal heading was then flown down the Po Valley from E->D->C->B->A with a profile ascent/descent 4000ft-FL150-4000ft from E->D and from D->C, the remainder being at 3000ft.

Summary:
A successful flight in more polluted conditions than B043. Aerosol optical depths were higher over the Adriatic than previously throughout the day, being 0.3 in the morning and 0.15 in the afternoon (Nicelli Airport) AERONET and 0.15 at ISDGM in the afternoon. Local fresh pollution was measured up the Po Valley. Uncorrected single scattering albedo reached ~0.87 in the lower pollution layer, but due to problems with both neph and psap, this cannot be considered reliable.

Problems:
Nephelometer failed again part way through the flight, and was intermittent.
PSAP front display is still showing different values to those on Horace.
PCASP (wing mounted) is missing the first three channels.

Sortie Debrief

Flight Number: B045 Date: 28th August 2004

Sortie Objectives: ADRIEX flight #3. To investigate the pollution up the Po Valley using in-situ measurements for comparison with ADRIEX flight #1.

Operating area: Po Valley and ocean areas over the northern Adriatic Ocean. 5 points were defined:-

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D:-	Reggio Nell Emilia	44°42'N, 10°32'E
E:-		44°30'N, 10°00'E

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Problems:
Nephelometer failed again part way through the flight, and was intermittent.
PSAP front display is still showing different values to those on Horace.
PCASP (wing mounted) is missing the first three channels.

Intermittent problems with HORACE displaying new plots & windows including on flight manager & aircraft scientist displays. Related to no. of display windows open?

Aircraft Scientist's Log

Flight No **B**.045..... Date ..29/8/04..... Page ..1.. of ..19..

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GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
080000		Take off Treviso		Treviso Airport	Widespread cirrus, contrails visible extensive.
					Cu to left of runway on t/off
					& right esp over high ground
					Mountains obscured, heavy pollution
					layer capped by Cu to left of
					take off
					Bio smoke, small fires on ground to left as turning
					Some Cu below
080433					Cu below on ~~left~~ right, Ci only on ~~left~~
080807					Over Sea Sc Cu below, 8/8 Ci above
					Co up to 180 ppb in bottom 400m
081232		5000ft			Pollution layer below visible
081258	P1	5000 ↓			Sc Cu below & to right
081359		4500 ↓			Pass over change in ocean colour
					Contrails
081619					Cloud @ min level
081616	P1	3000ft			Neph off.
081856	P29	3400			In cloud
08	P2	4000ft			Above cloud ..
082134					O_3 67, CO, 120
082422					CO calibrating 120-136 pre calib
082829	end of R10				Right turn, above pollution
082831					
082941	R2	4000ft			Neph up, change in ratio
083600		4000ft			Cu below
083806		4000ft			Reads 6, HORACE 2 e-6

Aircraft Scientist's Log

Flight No B.045 Date ..... Page 2 of 10

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
083932		4000ft			w/o uncor 0.89 using PSAP dial
					0.98 ~~reading~~ HORACE!
					Cu below
084224		4000ft			PSAPS 4-500 Nephs up
084354					Clear below, Cu to left+right
					Sc Cu + contrails above
08					O_3 high - photochem
08 4605					Filters ? unconnected
084608	R1.2				Structure in neph, CNC, CO, O_3
084815	R1.3	4000ft			clear below, contrails, Ci
085125	R1.3				Cloud below Sc.
					2½ mg m^{-3}, sulphate change
					in aerosol AMS @ point C
					+ ammonium nitrate
085255	R1.3	4000ft			cloud below, nephs dropped off.
					CO 140-41 ppb.
085350	R1.3	4000ft			Bumps, some Cu extending to this level.
085540	R1.3	4000ft			cloud top lower, but still Sc Cu
					Pollution visible ~~to left~~ to right, Ci to left.
085659	R1.3	4000ft			thin pollution layer to right, clear slot below? Poll Becoming thinner ahead
085825	R1.3				Poss elevated pollution layer to North

Clear slot (in which we are), then some lower.
Mainly clear below. Sc Cu.

Aircraft Scientist's Log

Flight No **B**.045..... Date ..29/8/04..... Page ..3.. of 10.....

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
090057	R1.3	4000ft			Pollution to north visible.
					otherwise uniform clear below.
090256	R1.3	4000ft			Clear below, enforced inside turn
090506	R1.4	4000ft.	S-E		Clear below, 2 pollution layers vis,
					ahead, with clear slot in between.
					Top layer above Sc Cu
090836	R1.4	4000ft			Approaching thick pollution layer
					above & below cloud top.
					Above cloud clearly visible
090954	R1.4	4000ft			CO dropping off rapidly
091139					CO & neph dropping off – in clean slot.
091243	R1.4	4000ft			Sc Cu below, in clean slot
					Layers above & below
091547	R1.4	4000ft			Extensive Cu below, clean
					slot visible above cloud top,
~~091742~~	~~R1.4~~				level with
091742	R1.4	4000ft			Some peaks on CO but still low
					Sc Cu below, Ci above
091853	R1.4				~~neph low~~ sharp kink in CO, CN,
					& neph, entering pollution, clear
					air below.
091938	and R1.4	~~4000ft~~ end			Clear below Cloud above 6/8
092303	P1	4000ft↑			Clear below Cloud above
092514	P2	6000ft↑			Ext Sc Cu below, Ci above
					Double pollution layer still vis

092650 6500ft

CO, Neph & quickly top of aerosol layer

Aircraft Scientist's Log

Flight No **B.045** Date 29/8/04 Page 4 of 10

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GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
092816	P3 ↑	9000ft			Ex Cu below to left, clear below to right. Largely clear above
092957	↑	10000ft			CO & neph structure well correlated
0	add P3				in pollution layer. Well defined
093528	~~start~~	15000ft			CO calibration start.
093800		15000ft			CO calibration end.
093934	P4 ↓	15000ft			Sc Cu below heavier to east, multilayered cloud & aerosol structure to north.
094233	P4 ↓	12000ft			Sc Cu below, Larger Cu to North, Still two aerosol layers visible.
094451	P4 ↓	10000ft			Some structure, starting to increase
094721	P4 ↓	7500			
094854	P4	5500			abs 18, 200 scat, CO calibration
interrupt	P4	5000			Interrupt for CO calib @ 5000ft.
					Loss of data to Flight Manager screen.
					Clear below
Recovers	P4 ↓	5000			
095310					Instant neph peaks
095420	P4	4000			neph green 50, CNC 5840
095429	R2.1	4000			O_3 74, CO, 132, NO, SO2 5.25
					NOx 0.96
095751	R2.1	4000			Peaks in
					Sc Cu below, Some Ci above, All Cu

In pollution layer above,
O_3 72, CO 132, Sc 95

Aircraft Scientist's Log

Flight No B045 Date 29/8/04

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
~~10~~0138		4000			Cumulus below & around
100158					Cloud, bumpy
					neph
100405		4000			~~4~~ →7000ft Pollution layer
					[noted pilot suggests 5000ft for
					return leg)
100445		4000			Clear below, Ci & contrails
					above.
100736		4000			little ~~organic sulphates~~ or nitrates. AMS
&					Clear below
100952	R2.1 end	4000			Clear below, Ci above
					Nephs flat??
101007	R2.2 start	4000			Nephs back? clear below, Ci above
					Ci to west
101622	R2.2	4000			Clear below, power station
					to right.
102050	R2.2				Over sea, clear below,
					~~Cirr~~ Ci & contrails above.
102135	R2.2				Passing Lido!
102~~3~~9	R2.2 end of	4000			Neph & CO low
102~~3~~9	P5				Profile to 5000 to switch pilots etc
102439	P5 end				End of profile
103359	R3.1	5000ft			Start run over sea, III & Lido clear
					below, Ci above
103900	R3.1				Calib neph again....

Aircraft Scientist's Log

Flight No B.045..... Date ....29/8/04.. Page 5 of 10

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GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
10 4037	R3.1	5000ft			~~Neph back~~? CO 110, O_3 58, Neph
					reading -ve on Horace
104245	R3.1	5000			clear below. Very hazy. Ci
					above. (5/8) Cu to North.
104846	end of R3.1				Clear below, Clear above
105019	R3.2	5000			
105346	P6	5000 3000			Cloud ahead 4–7000 ft.
					Bumpy descending
10582	P6	3000			Bumpy – convection, running
					below cloud base, hopefully
					in 2nd pollution layer
					CO rising
105632	R3.3	3000			Bumpy, clear below, Sc Cu above
110147	R3.3	3000			CN @ 20 000, higher
					but more variable ahead.
110423					NOy high, carry max
					high scat, high cnc.
					Green scat 195 m^{-1} CNC 91000
110511	R3.3	3000			End of run
110753					NO channel off bottom
110820	R3.4	3000			CO 144, O_3 69 ppb clear
					below, Ci above C–D
111100	R3.4	3000			RH 94.6%
					Blank plots on Horace,
					numbers updating

Aircraft Scientist's Log

Flight No **B**.045..... Date ...29/8/04..... Page ...6... of ...10

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
11 14 18	R3.4	~~3000ft~~			O_3 66, CO 129, neph still
					somewhat elevated
~~11 16 26~~	~~R3.4~~				RH 94%
11 16 26	R3.4	3000			In cloud ??
11 18 59	R3.4	~~3000~~ 3600			CNC 8600, RH 89%
					O_3 68%, CO, 139, Clear below
11 21 20	R3.4	3000			Bumpy, clear below. Two
					distinct layers to RHS of
					plane with clear slot around
					cloud level
11 22 04	R3.4	3000		(Point D??	CO 123, O_3 68, neph 52
					RH 84 CNC 5220
11 24 14	R3.5	3000		D → E	~~End~~ of 2nd plume, with
					diff neph blue/red ratios ??
11 26 17	R3.5	3000			CNC 6910,
11 29 08	R3.5	3000			Bumpy, clear below 2 poll
					layers clearly vis 2 north,
					lower one thicker below cloud,
					upper one less distinct.
11 32 14	R3.5	3000			Apparent correlation between
					turbulence & PCASP → thermal
					updrafts mixing plumes?
11 33 43		3000			Bumpy Cu, up to ~7000ft just
					to N CNC 10000
11 36 12	R3.5	3000			↑CO & neph all climbing sharply

11 36 55 R3.5 3000 CO 138↑, neph 174.

Aircraft Scientist's Log

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GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
113844	Turning			turning over point E	Turning over motorway & some high ground.
					CO 171, O_3 75, raph 184
					CNC 10300 RH 89%
114054	P7↑	3000ft	E→D		clear below, Hags. Cu to North extending ↑ 7000ft
					Sc Cu around & above
114301	P7↑	6000ft	E→D		ScCu below, pollution layer below cloud visible to North. Upper pollution layer very thin but ~ 8000 ft. Look on way down.
114908	P7↑	FL110	E→D		Scattered Cu below, largely clear above.
115335	P7↑	FL150	D		Peaks observed in CO, O_3 etc just at point D @ top of profile
115832	P8↓	FL150	D→C		Cham calib finished
120024	P8↓	FL130	D→C		Few scattered Cu below. Largely clear above. Towing Cu (~8000ft) ahead to north. CO 75, O_3 40
120337	P8↓	FL100	D→C		extensive Sc Cu below.
120559	P8↓	FL70	D→C		Cu below
120942	P8end	3000ft		C	Bumpy, clear below, convection
121113		3000ft			Bumpy CNC 39900, CO 143, O_3 77, RH 89%

volume chemical/ aerosol noted in turn

Core chem calib ideal conditions.

50 - 3000 → FLUSH (12)
500 per min
6 + 12 = 15 mins

Aircraft Scientist's Log

Flight No **B**.045..... Date 29/08/04..... Page 8 of 10

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GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
121247	R4.1	3000ft	~~C-B~~ ~~B-C~~		Clear below Sc Cu above.
121330	4.1	3000ft	C-B		ove motorway
121601	4.1	3000ft			PCASP 1500; CN 20000
					Nap green 89 RH 92%
					7/8 μg/m⁻³ nitrate
					5 -"- Sulphate
					6-7 -"- organic
					ammonium buffered.
12:2153	4.1	3000ft			Clear below Sc Cu above.
					Ground fire on Left of cockpit
122323	4.1	3000ft.			uncorr w = 0.87 PSAP front panel
122419	4.1	3000			Bumpy. Convection quite strong
122754	4.1	3000			Clr below, agricultural, Cu above
122959	4.1	3000	B		Core chem calib, inside turn
123131	R4.2	3000	B-A		Core chem still calibrating
123546	R4.2	3000			several small/medium ground
					fires to North of flight path
					(ie @ o'clock!!)
123829	R4.2	3000			Passing powerstation @ 3pm pos
					Haze in district layer above us
					wind 2ms⁻¹ 240 deg.
124039	R4.2	3000			Over sea. Clear below.
					Ci e contrails to ~~west~~ east.
					Spdeb in Neph and sluice in
					CO_2

Aircraft Scientist's Log

Flight No **B**..045..... Date ....29/8/04..... Page ...9... of ...10...

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
124425	R4.2	3000ft		Point A	End of run, climbing to 5000ft
124640	R4.2	5000ft		~~Etc~~	Clear below, over lagoon.
		3000ft			Hazelayer ~~Visible~~
1300		—			Land, Treviso

CLOUD PHYSICS LOG

Flight No. B045 **Date: 29/8/04** **Operator: MAP** **Page 1 of 5**

G.M.T.	PCASP		FSSP	SID1	2D2-C			2D2-P			Remarks
DRS Time	Conc/cc	Mean R	Block Transfer	Particle Count	Conc/L	Max Size	Habit	Conc/m3	Max Size	Habit	
08:12:59	300		0	10							Start Profile 1 from 5000’
08:14:48	220			8							4000’
08:16:20	130			8							End of Profile 1 @ 3000’
08:18:46											Start Profile 2 from 3000’
08:20:01											End of P2 start of Run 1.1 @ 4000’
08:21:00	220		25	8							
08:23:00	180			8							
08:25:00	200			8							
08:27:00			Overheat								
08:28:09											End of Run 1.1
08:29:42											Start Run 1.2 @ 4000’
08:30:00	220			10							
08:32:00	200			10							
08:34:00	200			8							
08:36:00	400			8							
08:38:00	260			8							
08:40:00	300			8							
08:42:00	200			8							
08:44:00	380			8							
08:46:10											End of Run 1.2
08:48:15			On								Start Run 1.3 @ 4000’
08:49:00	580		25	8							
08:51:20	180			8							
08:53:00	200			10							
08:55:00	260			10							
08:57:00	220			10							
08:59:00	220			10							
09:01:00	210			10							
09:02:58											End of Run 1.3
09:05:09											Start Run 1.4 @ 4000’
09:06:00	260			10							
09:08:00	200			10							

CLOUD PHYSICS LOG

Flight No. B045 **Date: 29/8/04** **Operator: MAP** **Page 2 of 5**

G.M.T.	PCASP		FSSP	SID1	2D2-C			2D2-P			Remarks
DRS Time	Conc/cc	Mean R	Block Transfer	Particle Count	Conc/L	Max Size	Habit	Conc/m3	Max Size	Habit	
09:10:00	130		25	8							
09:12:00	110			8							
09:14:05	80			8							
09:16:00	70		26	8							
09:18:00	400			8							
09:19:38											End of Run 1.4
09:23:03											Start Profile 3 from 4000’
09:24:30	590			15							FL050
09:25:30	700			20							FL060
09:26:33	70			5							FL070
09:27:40	25			5							FL080
09:32:35	40			2							FL130
09:34:20	40			2							End Profile 3 @ FL150
09:39:36	HEATER	ON									Start Profile 4 @ FL150
09:40:41	90			2							FL140
09:41:33	20			3							FL130
09:42:37	100			2							FL120
09:43:41	130			2							FL110
09:44:43	80			2							FL100
09:45:49	70			2							FL090
09:46:49	85			2							FL080
09:47:35	70			2							FL070
09:48:25	900			10							FL060
09:49:28	800			10							FL050
09:54:24	250			10							End of P4 Start Run2.1 @ 4000’
09:55:00	260			10							
09:57:00	240			10							
09:59:00	400			10							
10:01:00	200			8							
10:03:00	150		27	8							
10:05:00	330			20							
10:07:00	220			15							

CLOUD PHYSICS LOG

Flight No. B045 **Date: 29/8/04** **Operator: MAP** **Page 3 of 5**

G.M.T.	PCASP		FSSP	SID1	2D2-C			2D2-P			Remarks
DRS Time	Conc/cc	Mean R	Block Transfer	Particle Count	Conc/L	Max Size	Habit	Conc/m3	Max Size	Habit	
10:09:00	200		27	10							
10:09:52											End of Run 2.1
10:11:07											Start Run 2.2 @ 4000’
10:12:00	350			10							
10:14:00	230			10							
10:16:00	145			10							
10:18:00	310			10							
10:20:00	350			15							
10:22:00	330			15							
10:23:22	300			15							End of Run 2.2 Start P5 from 4000’
10:24:44	180			10							End of Profile 5 @ 5000’
10:34:04											Start Run 3.1 @ 5000’
10:35:00	280			10							PCASP HEATER OFF
10:37:00	270			10							
10:39:00	260		28	10							
10:41:00	305			10							
10:43:00	500			20							
10:45:00	340			15							
10:47:00	270			10							
10:48:15											End of Run 3.1
10:53:00											Start Profile 6 from 5000’
10:53:59	180			10							4000’
10:55:26	600			10							End of Profile 6 @ 3000’
10:57:48											Start Run 3.2 @ 3000’
10:58:00	800			15							
11:00:00	1200			10							
11:02:00	1400			10							
11:04:00	900			10							
11:05:16											End of Run 3.2
11:08:23											Start Run 3.3 @ 3000’
11:09:00	700			10							
11:11:00	900		Overheat	10							

CLOUD PHYSICS LOG

Flight No. B045 **Date: 28/8/04** **Operator: MAP** **Page 4 of 5**

G.M.T.	PCASP		FSSP	SID1	2D2-C			2D2-P			Remarks
DRS Time	Conc/cc	Mean R	Block Transfer	Particle Count	Conc/L	Max Size	Habit	Conc/m3	Max Size	Habit	
11:13:00	1400			10							
11:15:00	750			10							
11:17:00	1200			10							
11:19:00	900			15							
11:22:07											End of Run 3.3
11:24:14											Start Run 3.4 @ 3000’
11:25:00	160			15							
11:27:00	260			15							
11:29:00	200			15							
11:31:00	230			15							
11:33:00	160			15							
11:35:00	1000			20							
11:37:00			ON								End of Run 3.4
11:40:52											Start Profile 7 from 3000’
11:42:07	290		28	15							FL040
11:43:16	310			10							FL050
11:44:18	100			5							FL060
11:45:20	60			5							FL070
11:46:16	300			5							FL080
11:47:17	270			10							FL090
11:48:16	75			1							FL100
11:49:20	15										FL110
11:50:25	5										FL120
11:51:20	10										FL130
11:52:36	10										FL140
11:53:36											End of Profile 7 @ FL150
11:58:32	HEATER	ON									Start Profile 8 from FL150
11:59:50	40			1							FL140
12:00:37	15			1							FL130
12:01:43	30			1							FL120
12:02:39	50			1							FL110
12:03:34	80			1							FL100

CLOUD PHYSICS LOG

Flight No. B045 **Date: 28/8/04** **Operator: MAP** **Page 5 of 5**

G.M.T.	PCASP		FSSP	SID1	2D2-C			2D2-P			Remarks
DRS Time	Conc/cc	Mean R	Block Transfer	Particle Count	Conc/L	Max Size	Habit	Conc/m3	Max Size	Habit	
12:04:20	190		28	5							FL090
12:05:15	130			2							FL080
12:06:00	90			2							FL070
12:06:46	230			5							FL060
12:07:41	210			5							FL050
12:08:40	1500			10							FL040
12:09:37	680			10							End of Profile 8 @ 3000’
12:12:48											Start Run 4.1 @ 3000’
12:13:00	890			10							
12:15:00	1200			10							
12:17:00	700			10							
12:19:00	750			10							
12:21:00	410			10							
12:23:00	140			5							
12:25:00	150			5							
12:27:00	170			5							
12:29:00	140			5							
12:30:00											End of Run 4.1
12:31:32											Start Run 4.2 @ 3000’
12:32:00	300			15							
12:34:00	310		29	15							
12:36:00	380			15							
12:38:00	370			10							
12:40:00	370			10							
12:42:00	240			10							
12:44:00	240			10							
12:44:30											End of Run 4.2
	PCASP CH1,2,3 u/s										
	SEADAS Tape time offset = +3										

SWS/SHIMS PRE-FLIGHT LOG		Date	29/8/04	Flight	B 045
Operator(s)	A. Wilson	Campaign	ADRIEX		
Departure	29075808Z	Arrival	29 13000Z		

Physical system setup

~~Module~~ Serial Number	Connection(e.g.SWS nir, SHIMS upper)
0	SWS NIR
27581	SWS VIS

System functionality check After system stabilizes

PC to DRS Time error	$t_{PC}=t_{DRS}$ +	0Secs	at time	062600Z
Freezer temp				

SWS FLIGHT LOG SHEET

Flight # B 045 | Date 29/8/04 | Operator(s) A. WILSON | log page 1 of 2

Time	Run id	Alt/FL	Mirr Pos	Int Times Vis	Int Times NIR	Remarks
072930			90°A			DARK CURRENT VIEW.
074300						DATA START
074500						VIDEO RECORD.
075808				Auto		TAKE off!
075924			0°			sample period 1 second.
081456	P1	050→010				
081616	P1	030		Auto		end at 030.
081846	P2	030-040				
082001	P2			Auto		End @ FL040
082001	R1	040	0°			Point A → B
082040						Pc Clock advanced 1 minute to tie in with aircraft time. *
082909	R1			Auto		END
082942	R1.2	039	180°			Point B to C
	R1.2			Auto		End @ C
084815	R1.3	040	0°			C to D
090303	R1.3	040	0°			end @ D
		040	180	Auto		
090509	R1.4	040	180°	Auto		D To E
091938	R1.4	040	180°	Auto		End @ E
092303	P3	040	0°	Auto		Profile 3 040 → 150
093419	P3	150	0°	Auto		end P3 @ Point D.
093936	P4	150	180°	Auto		Profile P4 FL150 → FL040 to Point C
095424	P4	040	0°	Auto		
	R2.1	040				Point C to B.
100952	R2.1	040	0°	Auto		end @ Point B
101107	R2.2	040	180°	Auto		Point B to A.
	R2.2	040				End @ Point
	P5	040-050				
102441	P5	050				end P5
103404	R3.1	050	0°	Auto		A to B
103816	R3.1	050	0°	Auto		@ Point B
104945						video stop
104957						Video start (new cassete)
105300	P6	050-030	180°			Profile to 030 to escape cloud.
105632	P6	030	180°			end of P6 @ FL050
105748	R2.3	030	180°	Auto		180° B to C
110516	R3.3	030	180°			@ Point C
110823	R3.4	030	0°	Auto		C TO D
112207	R3.4	030	0°	Auto		End @ Point D
112325		030	180°	Auto		min int period set to 10mS.
112414	R3.5	030	180°			D to E

SWS FLIGHT LOG SHEET

Flight # B 045 | Date 29/8/04 | Operator(s) A. Wilson | log page 2 of 2

Time	Run id	Alt/FL	Mirr Pos	Int Times Vis	Int Times NIR	Remarks
113657	R3.5	030	180°	Auto		END R3.5 @ Point E
114052	P7	030 - 150	0°			P7 030 → FL150 Point E to D.
115546	P7		0°			END P7 @ Point D.
115832	P8	150-030	180°	Auto		P8 FL150 → Point D to C
120936	P8	030	180°	Auto		end P8 @ Point C
121248	R4.1	030	0°	Auto		C to B
122958	R4.1	030	0°	Auto		End R4.1 @ B
123131	R4.2	030	180°	Auto		B to A
124426	R4.2	030	180°	Auto.		end R4.2 @ A
124540						Dark current measure.
130230						DARK CURRENT measure.
LAND	130000					
131245						Video off

CORE CHEMISTRY FLIGHT LOG

FLIGHT:	**B045**	**DATE:**	29/08/2004	**OPERATOR:** Doug Anderson	**PAGE:** **1** of **1**
LOCATION:	Po Valley, N Italy			**PROJECT:**	ADRIEX – flight to investigate pollution in the Po Valley, Italy

GAS CYLINDER PRESSURES	N2	Argon/CO2	CO
PRE FLIGHT	psi / bar	psi / bar	psi / bar
POST FLIGHT	1280 psi / 122 bar	2370 psi / 162 bar	720 psi / 50 bar

TIME (GMT)	HEIGHT (Flight Level)	RUN #	CO SENSITIVITY (Hz/ppbV)	CO BACKGROUND (ppb)	CO BCKGRD.CNT.B (Hz)	CO CONC. (ppb V)	O3 (ppb)	NO (ppb)	NO2 (ppb)	NOx (ppb)	SO2 (ppb)
28/08/04 12:55:33	FL050	R7	90.77	61.13	5549.01	-	-	-	-	-	-
	Remarks: last calibration data from previous flight for comparison with today.										
29/08/04 ::	ground	-				-	-	-	-	-	-
	Remarks: First cal of day. Air sample pipe closed.										
05:18:55	ground	-	83.43	56.18	4687.01	-	-	-	-	-	-
	Remarks: ASP closed.										
07:03:46	ground	-	84.42	66.52	5615.79	684.749	-	-	-	-	-
	Remarks: ASP closed.										
07:31:08	ground	-	80.85	69.17	5592.47	186.569	-	-	-	-	-
	Remarks: ASP closed. CO cal max values : 502-537										
07:38:27	ground	-	80.42	69.66	5601.74	203.066	-	-	-	-	-
	Remarks: ASP closed. CO cal max values : 521-526										
07:53:46	ground	Taxiing	86.44	68.36	5908.38	183.941	-	-	-	-	-
	Remarks: ASP closed. Post power changeover/reboot cal. CO cal max values : 565-590										
07:58:37	ground	taxiing	82.58	69.59	5746.92	189.330	40	0.99	3.87	4.86	5.75
	Flow Lamp: 33.91	Press Monocr	0.78	Press Cell:	7.13	Press Cal Gas	2.61	Lamp °C	50.00	Monocr °C	26.78	PMT °C	26.72
	Remarks: ASP closed. CO cal max values : 499-504 Take off acceleration began a few seconds before end of cal.										
08:08:23	FL050	-	81.12	70.16	5691.17	-	-	-	-	-	-
	Flow Lamp: 33.87	Press Monocr	0.75	Press Cell:	7.13	Press Cal Gas	2.60	Lamp °C	-	Monocr °C	-	PMT °C	-
	Remarks: Air sample pipe now open. CO cal max values : 514-518										
08:21:00	FL030	> P2	81.38	70.24	5715.97	-	-	-	-	-	-
	Remarks: CO cal max values : 525-530 Climb/P2 started half way through cal to get above cloud. Levelled at FL040 before end of cal.										
08:26:20	FL040	R1	81.33	70.02	5694.69	110.262	62	0.11	0.53	0.63	5.09
	Remarks: CO cal max values : 524-527										
09:38:08	FL150	-	83.90	65.08	5459.84	93.278	63	-0.02	0.21	0.19	6.93
	Flow Lamp: 33.85	Press Monocr	0.70	Press Cell:	7.13	Press Cal Gas	2.57	Lamp °C	50.00	Monocr °C	26.41	PMT °C	26.36
	Remarks: Post P3										
09:52:20	FL050	-	83.86	66.34	5563.66	144.198	80	0.03	1.15	1.18	5.19
	Remarks: Cal started 09:49:24 CO cal max values : 524-530 Interrupt to P? @ FL050 for CO cal.										
10:51:47	FL050	-	83.10	65.52	5444.24	119.278	59	-0.02	0.83	0.80	5.37
	Flow Lamp: 33.82	Press Monocr	0.76	Press Cell:	7.14	Press Cal Gas	2.61	Lamp °C	50.00	Monocr °C	26.70	PMT °C	26.65
	Remarks: CO cal max values : 516-520										
11:58:24	FL150	-	85.41	61.71	5270.77	97.210	63	-0.12	0.30	0.18	6.89
	Remarks: CO cal max values : 537-541										
12:33:25	FL030	-	87.19	61.32	5346.26	135.172	67	0.02	1.14	1.16	4.84
	Flow Lamp: 33.44	Press Monocr	0.78	Press Cell:	7.15	Press Cal Gas	2.62	Lamp °C	50.00	Monocr °C	25.88	PMT °C	25.81
	Remarks: CO cal max values : 534-539 Cal started at end of R4.1 (12:29:58)										
::	FL										-
	Flow Lamp:	Press Monocr		Press Cell:		Press Cal Gas		Lamp °C		Monocr °C		PMT °C	
	Remarks:										
::	FL										-
	Flow Lamp:	Press Monocr		Press Cell:		Press Cal Gas		Lamp °C		Monocr °C		PMT °C	
	Remarks:										
::	FL										-
	Flow Lamp:	Press Monocr		Press Cell:		Press Cal Gas		Lamp °C		Monocr °C		PMT °C	
	Remarks:										
::	FL										-
	Flow Lamp:	Press Monocr		Press Cell:		Press Cal Gas		Lamp °C		Monocr °C		PMT °C	
	Remarks:										

Flight Manager's In-Flight Log

Flight No B..045.... Date ..29.8.04..... Page ....1.. of ....2.

Video Tapes
(V8)
No. #1.
Ends 1108
FFC / RFC / (OFC) / (UFC).

	GPS	INU
Lat	45 39.18N	45 39.16N
Long	12 12.06E	12 12.06E
Time	07 44:28	07:44:07
Status	✓	NAV.

DRS	☑
HORACE	☑
SATCOM	☐

GMT	EVM	Height	QNH	Hdg	TAT	DP	DI Htr	Wind/ Sea st.
074310	INJ to NAVIGATE							
075859.	TAKE	OFF FROM TREVISO.						
							BAP avg 10s.	
	ATC	restrictions mean no RUN @				10000ft.		→ 30s
	UBBR	covers off.		0620				
090303								
				AB, BC, CD, D→E		Explorer lost FIBUM		
090509.	Start	RUN	1.4 D→E					
091938	End	RUN	1.4					
092303	Start	Profile	P3 ↗					
		4000ft	→ FL150					
093936	Start	P4 ↘						
094926	Int	P4 @	~~5000~~ 5000ft.					
095308	Recon	P4	↑					
		Level	at 5. for Cals					
095424	End	Profile	4 @	4000ft	/ Start Run		2.1	@ Charlie
	End	RUN 2.1	@	Bravo, 4000ft.				
		inside two	then	next runs @ 5000ft.				
	Start	RUN 2.2	2	B→A	@ 4000ft.			
	End	RUN 2.2	at	Alpha.	/ Start P5			
102446	End	P5	5000ft.					
103404	Start	RUN 3.1		A→B				
104816	End	RUN 3.1		Bravo				
	Start	RUN	3.2	B → C		5000ft		
105300	Start	Profile	6 ↘					

Flight Manager's In-Flight Log

Flight No B..045..... Date ....29.8.04..... Page 2 of 2....

Video Tapes
V8
No.
Ends 1108.
FFC / RFC / DFC / UFC

	GPS	INU
Lat		
Long		
Time		
Status		

DRS	☐
HORACE	☐
SATCOM	☐

GMT	EVM	Height	QNH	Hdg	TAT	DP	DI Htr	Wind/ Sea st.
105632	END	PROFILE	6		3000ft			
105748	START	RUN	3.3		3000ft.			
110516	END	RUN	3.3		3000ft.		Charli	
110823	START	RUN	3.4		3000ft	C → D		
112207	END	RUN	3.4		3000ft	Delta		
112414	START	RUN	3.5		3000'	D → E		
113657	END	RUN	3.5			Echo		
		FM Fltsumm okay again.						
								ETA 1305
		A ↗ 5000ft → Treviso						
125841	LAND	AT TREVISO.		5h00				
			GPS Pan position					
			45°	39.15	N	45° 39.	16N	
			12°	12.06	E	12° 12.06	E.	
0936	PSAP	Filters	@ FL150		Filter	1		
1248	"	"			Filter	2		

Flight Manager's Instrument Status Log

Flight No. **B**.....045..... Date .....29. 8 04.....

Instrument	Fitted	Operated	Instrument	Fitted	Operated
Navigation			**Cloud Physics**		
INU			**Probes**		
GPS			FFSSP		
Satcom C			PCASP		
Satcom H			2D-P		
Thermometers			2D-C		
De-Iced Temp			Cloudscope		
Non De-Iced			SID 1		
Heimann			SID 2		
Hygrometers			CPI		
G. Eastern			HVPS		
J. Williams			**Racks:**		
Nevzorov			INC		
TWC			CCN / CNC		
FWVS			CVI		
Radiometers					
Upper Clear			**Aerosol**		
" Red			PSAP		
" Silicon			Nephelometer		
" JO1D			AMS		
Lower Clear					
" Red					
" Silicon					
" JO1D					
Large Radiometers					
TAFTS					
MARSS					
DEIMOS					
ARIES					
SWS / SHIM					
Chemistry					
Ozone					
ECGC					
NOX					
CO			**Others:**		
ORAC					
PAN					
PERCA					
WAS					

Flight Manager's Faults / Incidents Log

Flight No. B045

Instruments

1. PSAP - output voltages don't fit in with cal
2. Neph - after t/o, all signals at. -0.91E-6m^{-1}. Sw off/on, no better. Do cal then away.
3. UFC - debris/ ↗ or smudge? on lens.
4. Iexplorer error on clicking ok on Update Fltsumm. No server. close index, Plot + Fltsumm + re open e then ok. Plot window comes up with 0's for all the data
5. A/c scientist horace display not displaying
6. Neph - strange values after cal, reset 100949 and again 10:21:05. Readings all -0.91.
7. Aft CorCon CB panel - GE CB v. sticky

Aircraft

Intercom - Aft CorCon can't hear corChem.

Lot of breakthrough from flight deck (IRR training).

Text display for SATCOM

```
00099  29-AUG-04  12:21:12   728  LATEST POSN RPT RECD..
LATEST POSN RPT RECD..
No weather information available for LIPH,.
No weather information available for LIPR,.



LIPZ VENICE TESSERA  (Elev. 7 ft - 0mb) VCE
Today 29/08/04 Sunrise 04:32 Sunset 17:48 UTC



METAR
LIPZ 291150Z VRB03KT CAVOK 26/18 Q1016=
LIPZ 291120Z VRB03KT CAVOK 26/20 Q1016=
LIPZ 291050Z VRB03KT CAVOK 26/19 Q1016=
LIPZ 291020Z VRB02KT 9999 FEW020 BKN220 26/19 Q1016=

TAF
LIPZ 291100Z 291221 13005KT 9999 FEW030 SCT080=



E - Exit  P - Prev            H - Step>
```